

# HOUSE BUDGET COMMITTEE

## Democratic Caucus

The Honorable John M. Spratt Jr. ■ Ranking Democratic Member

B-71 Cannon HOB ■ Washington, DC 20515 ■ 202-226-7200 ■ [www.house.gov/budget\\_democrats](http://www.house.gov/budget_democrats)

September 23, 2002

### **Lindsey is in the Ball Park: A War on Iraq Could Cost \$100 Billion to \$200 Billion**

Dear Democratic Colleague:

On September 16, *The Wall Street Journal* reported that the President's chief economic adviser, Lawrence Lindsey, estimates that an attack on Iraq would cost the United States \$100 billion to \$200 billion. Two days later, the *Associated Press* reported that OMB Director Mitchell E. Daniels, Jr., believes that Mr. Lindsey's estimate is "very, very, high." An analysis by the House Budget Committee Democratic Staff supports Mr. Lindsey's estimate, and the executive summary of that report is attached for your information.

The attached analysis indicates that the initial military operation alone could cost \$48 billion to \$93 billion, if ten-year interest costs are included. The report stresses that an initial military victory would be only one stage of an action against Iraq, and that other costs would be incurred. These are not factored into the estimate, but such costs might include:

- U.S. peacekeeping or occupation forces
- Inducements to attract allies through foreign assistance or loan forgiveness
- Impacts on the economy due to increased oil prices
- Humanitarian assistance

The \$48 billion to \$93 billion estimate of the initial military operation assumes a war lasting 30 to 60 days and a U.S. force ranging from 125,000 to 250,000 total troops (one-quarter to one-half the size of the Persian Gulf War force). Moreover, the analysis assumes U.S. military operations will go as they went during the Persian Gulf War, with inept enemy forces, no use of chemical or biological weapons, access to bases and airspace in most Gulf states and Turkey, and low casualties on our side.

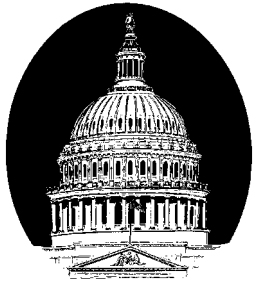
The report emphasizes that any or all of these variables could change for the worse, and if so, costs could be significantly higher than estimated. The report further discusses the fact that U.S. costs of the Persian Gulf War were largely offset by allied contributions. Unless circumstances change, it appears unlikely the United States would receive such substantial contributions today. If this is the case, any new military action against Iraq would have a much larger impact on the budget than did the Persian Gulf War.

The report primarily focuses on estimating the costs of the initial military operation. However, when all costs are considered, Mr. Lindsey's estimate of \$100 billion to \$200 billion seems to be in the ball park.

The full report is available on the House Budget Committee Democratic Caucus website at [www.house.gov/budget\\_democrats/](http://www.house.gov/budget_democrats/). You can also obtain a hard copy by calling Democratic staff at 226-7200.

Sincerely,

John M. Spratt, Jr.  
Ranking Democratic Member



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The Honorable John M. Spratt Jr. ■ Ranking Democratic Member

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### **Assessing the Cost of Military Action Against Iraq: Using Desert Shield/Desert Storm as a Basis for Estimates**

**An Analysis by the House Budget Committee  
Democratic Staff**

**September 23, 2002**

*This document has not been reviewed and approved by the Democratic Caucus of the House Budget Committee.*

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*Notes:*

*No classified information is used in this report. All data is from open sources.*

## **Table of Contents**

<b>Executive Summary .....</b>	<b>1</b>
<b>I. Introduction .....</b>	<b>5</b>
<b>II. Allied Contributions .....</b>	<b>7</b>
<b>III. Potential Differences Between Desert Shield/Desert Storm and Military Action Today .....</b>	<b>9</b>
<b>IV. Estimates of Costs of A New War with Iraq .....</b>	<b>18</b>
 <b>Appendix One: Summary of Conduct of the Persian Gulf War and Breakdown of Costs by Major Categories .....</b>	 <b>24</b>
<b>Appendix Two: Explanation and Discussion of Estimating Methodology .....</b>	<b>28</b>
 <b>Endnotes .....</b>	 <b>32</b>

## Executive Summary

The cost of ousting Saddam Hussein from Iraq may not be the crucial factor in deciding whether to invade Iraq, but the cost would be significant and would have a large impact on a federal budget already in deficit. Many Members of Congress have thus indicated a desire to have some notion of the costs of such military action.

This analysis reviews the experience of the Persian Gulf War and identifies variables that would likely make the cost and budgetary impact of military action now against Iraq different from the costs of the Persian Gulf War. For example, as *Part II* of the report discusses, allied contributions largely offset the U.S. costs of the Persian Gulf War, so the total cost of the war was much larger than the impact on the budget. Based on these factors, estimates for two generic war scenarios are offered as a starting point for discussions about the possible costs.

The analysis focuses simply on the cost of achieving an initial military victory. Besides the toppling of Saddam Hussein, U.S. policy would also be to seize or destroy weapons of mass destruction and the facilities to develop or produce them, and assist a post-Saddam Iraq in becoming a stable, peaceful democracy. These missions would entail significant costs beyond those included in this report. In addition, incidental economic consequences of a war with Iraq, such as a spike in oil prices, are beyond the scope of this report but should also be considered as a cost of invading Iraq. When these other costs are considered, a new war against Iraq could easily total as much as \$200 billion.

### ***Using Persian Gulf War Data to Estimate Costs of Military Scenarios Today***

The table on the next page summarizes the cost estimate of new military action today against Iraq assuming a total U.S. force of 250,000 personnel in the “New War A” scenario, which would conform with the reported upper end of Pentagon war plans, and 125,000 U.S. military personnel in the “New War B” scenario, which is loosely based on press reports of options involving fewer forces. Persian Gulf War costs are provided for comparison.

For both scenarios, the estimate assumes that a new war would be over within 30 to 60 days of commencing combat, that U.S. casualties would be comparable to the Persian Gulf War, that U.S. forces have unfettered access to bases and airspace in

#### ***Use of Persian Gulf War Data***

There are limitations and pitfalls in using cost data from the Persian Gulf War to forecast costs for U.S. military action today, and these are discussed in the report. However, as is also discussed, alternative methods that require more precise data – such as classified Department of Defense cost models – are not publicly available. Persian Gulf War cost data have the virtue of ready access as well as relevance to the same (albeit changed) enemy in a similar theater of operations.

key Persian Gulf states and Turkey, and that while the logistical buildup would proceed more quickly, U.S. troops would be in the theater of operations for about the same length of time as during the Persian Gulf War (see *Part IV* and *Appendix Two* for detailed explanation of assumptions).

**Comparing the Costs of the Persian Gulf War to  
Estimates of the Costs of New U.S.-Iraq War Scenarios “A” and “B”  
(Constant 2002 Dollars in Billions)**

<b><u>Cost Category</u></b>	<b><u>Persian Gulf</u></b>	<b><u>New War A</u></b>	<b><u>New War B</u></b>
Airlift/Sealift (Buildup)	10.6	6.6	5.0
Personnel & Personnel Support	21.5	11.3 - 13.4	6.7 - 7.7
Operating Support & Fuel	32.2	14.6 - 24.1	7.9 - 12.7
Investment	10.1	10.1	7.0 - 10.1
All Other	<u>5.6</u>	<u>5.6</u>	<u>3.9</u>
<i>Subtotal, Cost of Defeating Iraq</i>	<i>79.9</i>	<i>48.3 - 59.8</i>	<i>30.6 - 39.4</i>
Interest Costs (10 year)	43.3	26.8 - 33.2	17.0 - 21.9
<b>Total Cost of Defeating Iraq</b>	<b>124.2</b>	<b>75.1 - 93.0</b>	<b>47.6 - 61.3</b>

*Notes: Numbers do not add due to rounding; Persian Gulf War does not include offsetting allied contributions and thus is gross total of war costs; interest costs for Persian Gulf are what they would be today based on gross cost; see Appendix Two for explanation and discussion of methodology for new war scenarios.*

These generally optimistic assumptions are rooted in the experience of the Persian Gulf War. However, recognizing that any cost estimate of hypothetical military options is inherently speculative, *Part III* of the report discusses variables that could complicate U.S. military operations in a new war with Iraq. If the war did not proceed as rapidly or as smoothly as assumed in the report’s scenarios, the costs of achieving even the initial military victory could increase substantially.

***What Is Not Included in the Estimates***

Disclosing what is not assumed in these cost estimates is as important as disclosing what is assumed. If these assumptions change, the estimates change as well. Most importantly, the estimates do not assume:

– ***An Extended U.S. Occupation or Peacekeeping Force.*** Many argue that unlike the Persian Gulf conflict – where the United States ejected Iraq from Kuwait, enabling the Kuwaiti government to return to power – a new war against Iraq to oust Saddam Hussein would compel the United States to remain as an occupation or peacekeeping force in Iraq for an extended period of time. If so, this could greatly increase the total costs of any military action against Iraq.

– ***Non-Military Costs of Any New War Against Iraq.*** Such costs would likely include humanitarian assistance to refugees, reconstruction assistance, and foreign assistance to obtain cooperation for U.S. military action. In addition, a war with Iraq could have an impact on the U.S. and global economy that in turn adversely affects the U.S. federal budget. Estimating such costs is beyond the scope of this analysis and they are thus not included, but if they materialize, they would increase the costs to the U.S. taxpayer.

## ***Conclusions***

After examining the costs of the Persian Gulf War, assessing the likelihood of allied contributions to any new war against Iraq, estimating the costs of different scenarios of war with Iraq, and identifying variables that could affect these estimates, the conclusions of this analysis are:

***(1) Military Action Today is Likely to Have a Greater Impact on the Deficit than the Effect of the Persian Gulf Conflict.*** The analysis indicates that the cost of the war and the impact on the U.S. budget can be two different matters. The analysis concludes that the cost of invading Iraq today would likely be less than the cost of the Persian Gulf War measured in constant 2002 dollars. But cash and other contributions from U.S. allies largely covered U.S. costs during the Persian Gulf War, so the impact on the budget deficits of the early 1990s was minimal. Unless circumstances change, it appears unlikely the United States would receive substantial contributions to offset costs in a new war against Iraq. Thus, even if the cost of U.S. military action today against Iraq is lower than the Persian Gulf War, the impact on the budget could be much larger.

***(2) Size Does Matter.*** While leadership, tactics, and the quality of combat troops are intangible factors critical to the success of any military operation, from a cost perspective, the size of the force and the duration of the conflict are major cost drivers. This report assumes a force no larger than 250,000 U.S. military personnel, or about half the size of the U.S. Desert Storm force. U.S. military planners could still conclude that should we attack Iraq, a larger force is needed to provide overwhelming U.S. force. If so, costs would go up significantly.

***(3) Further Pentagon Costs Are Likely.*** This analysis assumes U.S. forces would remain at or near full strength in Iraq for two and one-half months after the conflict before demobilizing at a pace consistent with the pattern of the Persian Gulf War. Many national security and foreign policy analysts believe that a sizeable U.S. force would



have to remain in Iraq for years to keep Iraq peaceful and stable. Sizeable U.S. forces kept in Iraq for an extended period of time could drive costs considerably beyond this report's estimates.

**(4) *The Cost of Military Action Reaches Beyond the Pentagon.*** This report focuses on the military cost of initiating action against Iraq for the purposes of regime change and destruction or seizure of Iraqi weapons of mass destruction and the facilities to develop and produce them. Many other costs – ranging from humanitarian assistance to refugees, reconstruction assistance, foreign assistance to obtain cooperation for U.S. military action, and interest costs due to increased borrowing to finance these other costs – would accompany U.S. military action against Iraq. These costs are not included in the estimates provided, but they may be significant.

**(5) *War Has Many Variables.*** The scenarios assumed in this report are inherently speculative. More importantly, these estimates are extrapolated from a highly successful previous engagement against the enemy in question 11 years ago. The nature of new engagement and its costs would be determined by factors discussed in this report – such as Iraqi military capabilities and tactics, basing and overflight rights available to the United States, the use (or not) of weapons of mass destruction by Iraq, the quality of U.S. forces and tactics – and factors not addressed in this report, such as the weather, internal Iraqi resistance efforts, and chance events. These scenarios are not meant to be exact forecasts of the costs, but rather are offered to give Members of Congress some sense of the possible magnitude of the costs if past experience is used as a guide.

**(6) *The Full and Total Cost of a New War with Iraq is Likely \$100 Billion to \$200 Billion.*** The analysis concludes that a U.S. force of 250,000 personnel that achieves the goal of ousting Saddam Hussein's regime in 60 days of combat that goes as smoothly as the Persian Gulf War will cost \$93 billion, including interest costs. When all of the other costs that would also be incurred – humanitarian assistance to refugees, reconstruction assistance, foreign assistance to obtain cooperation for U.S. military action, and interest costs due to increased borrowing to finance these other costs – are considered, the total would easily exceed \$100 billion. And if the war has an adverse impact on the U.S. or global economy, or proves more difficult and lengthier than assumed, \$200 billion may unfortunately prove to be a reasonable estimate.

## I. Introduction

The Bush Administration is actively considering using military force against Iraq to remove Saddam Hussein from power and to seize or destroy weapons of mass destruction and the facilities devoted to developing or producing those weapons. Estimating the cost of such military action requires knowing: the size of the force; the tactics of the operation; the duration of the conflict; the contributions of allies; the basing and overflight routes available to U.S. forces; the length and pace of the logistical buildup; whether or not an occupation force is required and for how long; and other factors. These factors are all unknown at this time.

The costs of the Persian Gulf War – Operations Desert Shield and Desert Storm – are known. This report discusses how military action against Iraq today may or may not differ from the Persian Gulf War from a budgetary standpoint, and provides cost estimates for several generic scenarios of a new war with Iraq. These generic scenarios are based primarily on the experience and cost data of the Persian Gulf War, and are intended to serve as a starting point for discussions about the possible costs of actual military operations. The scenarios are intended to roughly correlate to press reports of the upper- and lower-end of manpower requirements under consideration by the Pentagon.

The table below summarizes the cost of Desert Shield/Desert Storm (DS/DS):

**Cost of Desert Shield/Desert Storm**  
(Dollars in Billions)

	<u>Then-Year \$</u>	<u>2002 \$</u>
<b>Gross Cost of War</b>	<b>61.1</b>	<b>79.9</b>
Equipment (Allied In-Kind or Not Replaced)/Other	10.6	13.9
Funding (DoD Budget Authority)	50.5	66.0
<i>Less: Allied Cash Contributions</i>	<i>-48.4</i>	<i>-62.1</i>
<b><i>Net Cost to U.S. Budget (Excludes Equipment)</i></b>	<b><i>2.1</i></b>	<b><i>4.0</i></b>

*Source: Department of Defense.<sup>1</sup> Conversion to 2002 dollars by House Budget Committee Democratic Staff. The term “then-year” dollar simply means that the costs of the Persian Gulf conflict over the 1990 - 1992 period have not been adjusted for subsequent inflation.*

As the table indicates, the total cost of the Persian Gulf War was \$61.1 billion in then-year dollars and is \$79.9 billion in today’s dollars. Several of our allies provided equipment, fuel, or other supplies that helped defray the cost of U.S. operations. Such assistance is known as “in-kind contributions.” In addition, the United States either depleted or lost a certain amount of equipment that it chose not to replace. These two categories totaled \$10.6 billion, and are

considered part of the \$61.1 billion total cost of the war. When the cost of equipment either replaced by allies or not replaced at all is excluded from the calculation, the “cash” cost of the war was \$50.5 billion in then-year dollars and \$66.0 billion in today’s dollars. The \$50.5 billion represents incremental costs to the Department of Defense (DoD) in waging the war.

However, neither the \$61.1 billion “gross” cost of the war nor the \$50.5 billion cash cost measures the cost to the U.S. taxpayer, because our allies gave the United States \$48.4 billion in cash to cover our costs (\$62.1 billion measured in today’s dollars). The cost to the U.S. taxpayer was considerably less than the total cost of the war: \$2.1 billion at the time (\$4.0 billion in today’s dollars).

This report is not intended to be a thorough analysis of U.S. military options or a precise forecast of what new military action against Iraq would cost. Rather, it is offered to help Members of Congress discuss possible costs in a structured manner. *Part II* of this report discusses the importance of allied contributions to offsetting U.S. costs during the Persian Gulf War, and the likelihood of such contributions in any new U.S. military action taken against Iraq in the near future. *Part III* discusses the potential differences between the Persian Gulf War experience and military scenarios today, largely from a cost perspective. *Part IV* provides estimates of military action today under specified, assumed conditions. Conclusions are contained in the *Executive Summary*.

Also attached are two appendices. *Appendix One* provides background information about the Persian Gulf War, including costs. *Appendix Two* explains and discusses the methodology used to produce the *Part IV* estimates. The advantages and disadvantages of using cost data from the Persian Gulf War as the basis for these estimates are also discussed in this appendix.

## II. Allied Contributions

The first and arguably largest variable from a budgetary standpoint between what Operations Desert Shield/Desert Storm (DS/DS) cost the U.S. government and what military action today may cost is the issue of allied contributions. U.S. allies reimbursed the United States for the Persian Gulf War with \$48.4 billion in cash and another \$5.7 billion of in-kind contributions.

### **Allied Contributions in the Persian Gulf War** (Then-Year Dollars in Billions)

<b><u>Country</u></b>	<b><u>Cash</u></b>	<b><u>In-Kind</u></b>	<b><u>Total</u></b>
Saudi Arabia	12.8	4.0	16.9
Kuwait	16.0	0.0*	16.1
United Arab Emirates	3.9	0.2	4.1
Japan	9.5	0.5	10.0
Germany	5.8	0.7	6.5
South Korea	0.2	0.1	0.3
Other/Interest/Post-War Adjustments <sup>2</sup>	0.3	0.0*	0.3
<b>Totals</b>	<b>48.4</b>	<b>5.7</b>	<b>54.1</b>

*\*Less than \$50 million.*

*Note: Numbers do not add due to rounding.*

The Bush Administration is currently seeking international support for U.S. military action in Iraq, but the initial results thus far do not bode well for a repeat of sharing financial costs. Saudi Arabia, Kuwait, Japan, Germany, the United Arab Emirates, and South Korea provided almost all of the cash contributions during the Persian Gulf War. It is not yet clear whether all of these nations would lend diplomatic support to current U.S. calls for military action against Iraq; significant cash contributions seem unlikely at this time.

During DS/DS, in-kind contributions accounted for less than 10 percent of the gross cost of the war. Moreover, Saudi Arabia accounted for more than 70 percent of the in-kind contributions and provided the primary bases of operation for the United States and other coalition forces. Then-Secretary of Defense Dick Cheney noted,

*Without Saudi cooperation, our task would have been much more difficult and costly.<sup>3</sup>*

The United States is still trying to ensure Saudi Arabia's diplomatic support for a new war with Iraq, but Saudi permission to permit U.S. forces to use its territory and airspace is apparently linked to whether the United States can obtain a U.N. Security Council resolution authorizing military force.<sup>4</sup> Given the uncertainty of U.N. Security Council approval, and lack of public Saudi support for unilateral U.S. military action against Iraq, it is premature to assume that Saudi Arabia would provide in-kind contributions.

In summary, the United States received substantial contributions that largely offset its costs for the Persian Gulf War. The outlook for similar contributions to a new military campaign against Iraq is much less promising.

### **III. Potential Differences Between DS/DS and Military Action Today**

The Persian Gulf War was divided into two different operations; a five and one-half month logistical buildup of personnel and equipment known as Operation Desert Shield, and a 43-day war known as Operation Desert Storm. Approximately 500,000 U.S. forces participated in cooperation with many different allies. On January 16, 1991, Desert Storm began with air and missile attacks. After about five weeks of intense bombing in Iraq and of Iraqi forces in Kuwait, air power continued to complement the ground attack initiated by coalition forces on February 23. In about 100 hours, Iraqi forces were routed from Kuwait. The United States called a ceasefire on February 27, 1991. (See *Appendix One* for a more detailed summary of the conduct of the war and the cost of the war by major categories.)

This section identifies potential differences between a war that may occur today and the Persian Gulf War, from the viewpoint of how these differences might affect costs. It is not intended to be a thorough military analysis nor is it intended to be a definitive list of differences. The intention is simply to highlight issues that may affect the total cost of military action against Iraq today compared to eleven years ago.

***Number of Troops*** – The number of troops is a major factor in any cost estimate of potential military scenarios. The actual military goals of the operation would determine the number of troops required. According to press reports, the upper end of Pentagon war plans calls for 250,000 military personnel, or roughly half the number of U.S. forces used in Desert Storm.<sup>5</sup> Presumably, this level would be required if the goal is to gain territorial control of most of the country.

Press reports also indicate that the Pentagon is evaluating options requiring fewer troops. One reported option is a force built around 120,000 Army troops. Presumably, this represents four U.S. Army divisions and accompanying support units, and would be complemented by additional air and naval forces. Another option is for ground troops numbering about 70,000; presumably this ground force would also be complemented by air and naval forces. In these options, U.S. forces would direct action against selected critical targets and cooperate (to varying degrees) with anti-Saddam indigenous forces in Iraq.<sup>6</sup>

The fewer the troops, the lower the cost would be on a per-day basis, because fewer troops require less logistical support. However, the costs associated with a force of 250,000 personnel would not be assumed to be precisely half of the DS/DS force, because there are certain fixed costs involved in standing up any large military option. About 11 percent (\$4.6 billion in constant 2002 dollars) of the operational costs in DS/DS were fixed costs that were incurred in the process of standing up forces for combat.<sup>7</sup>

***Duration of Conflict*** – It is virtually axiomatic that the duration of the conflict is a significant variable in the total cost of the operation. The longer U.S. forces are overseas for the buildup preceding the attack, the attack itself, or post-victory missions such as peacekeeping or

nation building, the more logistical costs would mount. Even if the U.S. force today were half the size (or less) of the DS/DS force, a longer duration of combat operations would have a counterbalancing effect on the cost savings of a smaller force.

**Logistical Buildup** – In general, the cost of the logistical buildup is a modest cost variable in a large military operation compared to other factors such as the number of troops or the duration of the conflict.

During Desert Shield, sealift accounted for 95 percent of the transported cargo and equipment. While sealift is a much cheaper option than airlift on a cost-per-ton basis – airlift was about 12.5 times more expensive per ton than sealift during DS/DS – it also takes much longer.<sup>8</sup> To shorten the duration of the buildup, the Pentagon may rely more on the more expensive option of airlift rather than sealift, which could raise the cost of a buildup today relative to Desert Shield.

On the other hand, the United States has increased the amount of pre-positioned assets and the number of fast sealift ships. Also, the U.S. military is now much better at sending equipment and cargo in trackable containers, which both reduces unloading time and the time it takes to re-route equipment and cargo in-theater. In fact, the *New York Times* has reported that equipment transports have already begun,<sup>9</sup> and the *Los Angeles Times* reports that the United States now has the wherewithal to equip 150,000 U.S. personnel in the Persian Gulf area by Christmas.<sup>10</sup>

***Would a New Operation Desert Shield Go As Smoothly As the Last?***

Iraq made no effort to disrupt the buildup of U.S. and coalition forces that occurred during Desert Shield. If unhindered, the United States can provide logistical support more efficiently now than 11 years ago, and even if restricted to Kuwait, the buildup should not take the nearly six months it did during Desert Shield. However, Iraq may not stand by quietly in the event of a new buildup. While a head-on conventional attack is unlikely due to Iraq's degraded forces and the fact that Operation Southern Watch would deprive Iraq of the element of surprise, Iraqi covert operations or SCUD attacks are possible ways to disrupt a buildup of U.S. forces (see *Use of Chemical or Biological Weapons* for additional discussion).

From a budget standpoint, prolonging the logistical buildup drives up the cost of the operation.

Michael O'Hanlon, a noted defense analyst at the Brookings Institution, has argued that a buildup to support 250,000 combat troops could be completed in as little as three months if all goes well, but also notes that if the United States is confined to Kuwait as a basing area, it could take longer due to the limited availability of deep-water port capacity.<sup>11</sup>

***Basing Rights and Overflight Permission*** – The United States has not yet acquired basing rights for the purpose of conducting military operations against Iraq in the countries that hosted U.S. troops during DS/DS, although Kuwait, Qatar, Bahrain, Oman, and the United Arab

Emirates all currently provide the U.S. pre-positioning and/or air base facilities. A key unknown is Saudi Arabia, which shares a long border with Iraq – thus providing U.S. military planners multiple land- and air-attack options – and has several deep-water ports that would expedite a logistical buildup of U.S. forces. Anthony Cordesman, a noted defense analyst at the Center for Strategic and International Studies, argues:

*Major improvements have taken place in the air bases in Bahrain, Kuwait, and Qatar since the time of the Gulf War, but the United States and its allies would still be seriously base-limited if Saudi Arabia did not make its [air] bases available. Access to Saudi air space would also be critical for overflights, staging offensive air formations, refueling operations, and attacking from a wide range of vectors.<sup>12</sup>*

Not having ideal basing and overflight rights would likely be an inconvenience rather than an insurmountable obstacle for a U.S. military operation against Iraq, but it could increase costs in several ways. If airbase rights are limited, it could constrain the number of sorties per day, prolonging the length of an air campaign. Limited basing and overflight rights could also require longer flights and constrain refueling areas, in turn driving up refueling operations and costs. Limited basing rights could also limit the air routes the military takes into Iraq. Such limitations might permit Iraqi forces to better situate their anti-aircraft weapons, possibly prolonging U.S. air operations. (See *Ground Combat* below for discussion of the effect of limited basing rights on ground operations.)

Another variable from a budget perspective is that Turkey has expressed interest in cooperating with the United States but only under conditions, such as debt forgiveness. Turkey owes the United States approximately \$4 billion in total outstanding loans.<sup>13</sup> Other regional countries may place similar conditions on their support. While these costs would not be considered a military cost by government accounting standards, forgiving Turkey's loans and making similar concessions to other nations to secure cooperation would still be a cost borne by the U.S. taxpayer.

#### ***Basing During the Persian Gulf War***

During the Persian Gulf War, the United States enjoyed basing in several countries adjacent to or near Kuwait and Iraq, including Turkey, Saudi Arabia, Qatar, Bahrain, Oman, Egypt, and the United Arab Emirates. In addition, it flew B-52 missions out of England and Spain, requiring overflight permission from many other nations. Even so, virtually all strike missions against Iraq or Iraqi forces in Kuwait required refueling. Most of these refuelings occurred over Saudi Arabia.

As long as basing and overflight rights are no worse than an inconvenience to U.S. military operations, the cost impact would be minor to modest depending on the duration of the conflict. If, however, these rights are very limited and present the United States with such operational constraints that they prolong the conflict significantly, the cost impact is also significant.



***Capability of Iraqi Forces*** – Iraqi force capabilities are truly a wild card in cost estimates. If Iraqi forces capitulate easier and more quickly than projected, military operations would be shorter than expected, resulting in lower costs. The converse is also true.

Desert Shield lasted almost six months, but Desert Storm was over in 43 days – a remarkably short war given that the United States was facing the fourth largest army in the world at the time. However, Desert Storm was an operation to eject Iraqi forces from a country they had invaded not long before. The allied air campaign in Desert Storm greatly reduced the combat effectiveness of the Iraqi forces defending Kuwait, and severed most lines of communication and supply routes from Iraq.

It is not clear how Iraq would defend its own territory, but presumably it would have several advantages it did not have in Desert Storm. It has seen U.S. forces in action, and theoretically could use the “lessons learned” from its poor performance during DS/DS to avoid repeating the same tactical mistakes. For example, rather than having large numbers of troops dispersed unprotected in the desert, Iraq could concentrate its forces in urban areas. This strategy would almost certainly be ultimately futile,<sup>14</sup> but it could force the United States to fight in Iraqi cities, potentially slowing the pace, and thus increasing the duration, of U.S. operations. In essence, Iraqi forces would capitalize on our desire to avoid civilian casualties by using their own citizens as hostages to limit U.S. fighting capability.

In addition, on its own territory, and with years to prepare, Iraqi forces may better assure their logistical support. The Iraqis would be falling back on their own lines of communication, while we would be extending ours. Protecting their own territory could also conceivably boost the morale of Iraqi troops, improving fighting efficiency.

The table below compares the 1990 Iraqi force prior to Desert Storm with the most recent, unclassified estimates of the force as of 2000/2001:<sup>15</sup>

**Iraqi Forces: Then and Now**

	<b>August 1990</b>	<b>2000</b>
Army Personnel	955,000	375,000
Republican Guard Personnel	150,000	60,000 - 80,000
Tanks	5,000+	2,200
Artillery Pieces greater than 100mm	5,000+	1,900
Combat Aircraft	700	310

This table does not reflect other important but intangible factors, such as the quality of the equipment or the training Iraqi forces receive. Press reports indicate that many U.S. defense analysts believe that Iraqi forces today are significantly less effective than immediately prior to

Desert Storm. Any possible advantages that Iraq may possess as a result of “lessons learned” from 1990/1991 have to be considered in light of the significant deterioration of Iraqi forces caused by the loss in the Persian Gulf War and the ensuing trade sanctions.

**Ground Combat** – Major ground combat typically requires far greater numbers of personnel than air operations and thus costs much more in logistical support. Actual ground combat in Desert Storm lasted only 100 hours. However, the buildup and support of sizable U.S. ground forces during the five and one-half months of Desert Shield was also a major cost driver of the Persian Gulf conflict. If the logistical buildup and massing of troops is shortened relative to Desert Shield, it would result in cost savings compared to Desert Shield.

U.S. ground combat forces would have a decisive qualitative advantage over Iraqi ground forces. Limited basing options for U.S. ground forces may not seriously impede the entry of combat troops into and through Iraq directly; but limited basing options may restrict the number of main and alternate supply routes, thus making them more predictable and more vulnerable to Iraqi interdiction. On the other hand, reliance on ground supply routes could be alleviated by the use of airlift on captured airfields closer to the forward edge of the battle area. Still, it is possible that Iraq could have some limited success in harassing supply routes, thus prolonging the rate of operations, and in turn, the costs.

The number of troops, the length of time spent in the theater, and the duration of actual combat operations are the principal cost factors which determine how large a role ground forces have in total operational costs.

### ***Urban Warfare***

There is little doubt among most U.S. defense analysts that the U.S. military could decisively defeat Iraqi forces, even Iraqi forces entrenched in urban areas (see discussion in *endnote 14*). The question is how long it would take. If Iraqi forces entrench themselves in urban areas, holding innocent civilian Iraqis hostage, the United States could still defeat them. The U.S. qualitative advantage in leadership, training, precision weapons, equipment, and night vision gives the United States a decisive edge.

However, to avoid both U.S. and Iraqi civilian casualties, such urban warfare could be a painstaking process relative to the lightning quick 100-hour ground operation during Desert Storm. As discussed, prolonging operations drives up costs.

**Human Costs** – This is the most dreadful cost of war, but it cannot be calculated in financial terms and is therefore outside the scope of this study.

**Use of Chemical or Biological Weapons** – Much of the justification for invading Iraq is to seize or destroy Iraq’s weapons of mass destruction and the facilities to build them. The Central Intelligence Agency believes that Iraq may have hidden from U.N. inspectors 6,000 chemical munitions.<sup>16</sup> In addition, the DoD reports that U.N. inspectors found traces of a

chemical agent in 1998 on Iraqi ballistic missile warheads.<sup>17</sup> There thus seems to be little debate that Iraq does possess chemical weapons that could be used against U.S. forces.

The evidence is also clear that Iraq had a clandestine biological weapons program for years prior to the Persian Gulf War and that it continues today. What is unclear, however, is whether Iraq has developed a biological weapon that is militarily useful or can be delivered effectively by a ballistic missile or an unmanned aerial vehicle.

Finally, there is no disagreement that Iraq continues to try to develop a nuclear weapon. However, there is disagreement about how close the Iraqis are to obtaining a nuclear weapon, or how long it would take to construct a weapon should Iraq be able to obtain weapons-grade fissile material.

#### ***Chemical/Biological Weapons***

The temptation for Iraq to use weapons of mass destruction may be greatest when U.S. troops are building up. During this period, troops are relatively concentrated in a finite area, not easily mobile, and may not be at optimal readiness. Once combat begins, U.S. forces are dispersed and mobile, so even if Iraqi delivery of chemical or biological weapons is relatively accurate, U.S. forces have the ability to avoid the impact areas and take protective measures.

Iraq did not use any weapon of mass destruction against U.S. or coalition forces in the Persian Gulf War, even though it at least had chemical weapons available. Some argue that the threat of massive retaliation by the United States deterred Iraq from using these weapons during the Persian Gulf War. Such a threat may again deter Iraq from using them in a new conflict. However, many believe that if the purpose of U.S. military action against Iraq is regime change, Saddam Hussein is more likely to order the use of such weapons. If so, a weapon of mass destruction effectively delivered could greatly complicate the U.S. military operation.

The use of weapons of mass destruction is a wild card for estimating costs. Since the Persian Gulf War, the U.S. military has made great strides in training its personnel to operate while under attack from chemical or biological weapons. Fortunately, current U.S. military personnel have not experienced a chemical or biological attack under combat conditions, so it is difficult to know the exact effect on U.S. combat operations. It seems reasonable to assume that such attacks would impede U.S. operations, but that these obstacles would be overcome. The possible use of these weapons, however, also raises the prospects that casualties could be higher than in the Persian Gulf War.

***Air Combat*** – During Desert Storm, the air campaign was a distinct phase, and air power continued to complement the 100-hour ground campaign. While this model may hold true in a new war against Iraq, an alternative would be to shorten the air war considerably or simply start the air campaign in conjunction with the ground campaign to gain the element of surprise in “blitzkrieg” fashion. Such a tactic may reduce the chances for Iraq to use weapons of mass

destruction effectively against quickly dispersed, mobile troops.

While Desert Storm highlighted the potential of precision-guided munitions, 92.5 percent of all bombs and missiles used during Desert Storm were unguided. Yet, as the following table indicates,<sup>18</sup> the 7.5 percent of precision-guided munitions used accounted for 84.0 percent of the total munitions cost – essentially an inverse relationship of numbers procured to cost.

**Precision vs. Non-Precision Weapons  
in the Air Campaign of Desert Storm**

<b><u>Weapon Type</u></b>	<b><u>Number</u></b>	<b><u>% of Total Used</u></b>	<b><u>Cost*</u></b>	<b><u>% of Total Cost</u></b>
Unguided Bombs	210,004	92.5%	\$432.0	16.0%
Guided Bombs	9,342	4.1%	\$298.2	11.0%
Missiles**	7,819	3.4%	\$1,973.8	73.0%
<b>Totals</b>	<b>227,165</b>	<b>100.0%</b>	<b>\$2,704.0</b>	<b>100.0%</b>

*\*Measured in millions of 1990 constant dollars.*

*\*\*Includes surface-to-air missiles, anti-radiation missiles, and cruise missiles.*

It is unlikely that the United States would repeat the Desert Storm ratio of guided to unguided munitions in renewed conflict with Iraq for several reasons:

- 1) The percent of precision-guided weapons increased from less than eight percent in Desert Storm to 35 percent during Kosovo to 56 percent during Afghanistan.<sup>19</sup> U.S. Air Force doctrine is clearly relying more and more on precision weapons.
- 2) If combat is focused in or near urban areas, and U.S. policy is to minimize Iraqi civilian casualties and collateral damage, use of precision-guided munitions would become even more compelling.
- 3) If speed of operations is important, U.S. military planners would prefer to use precision-guided munitions against “high value” targets – such as command facilities, bridges, military storage facilities, and areas suspected as sources of weapons of mass destruction development – to ensure destruction of these targets as quickly as possible.

During the Persian Gulf War, the average cost of a Navy Tomahawk was \$3.6 million per copy in constant 2002 dollars, and it is about \$2.3 million per copy today – a decrease of about 35 percent.<sup>20</sup> However, while the per unit cost of precision guided munitions and missiles has decreased significantly since Desert Storm, these weapons are still much more expensive than unguided weapons. For this reason, the cost per tonnage of bombs and missiles expended could

be significantly higher than it was during Desert Storm.

Of course, the effectiveness of precision guided weapons should decrease the volume of bombs and missiles required to eliminate enemy targets, thus offsetting to some degree the increase in per-unit cost. A key cost factor would thus be the total number of targets. As discussed previously, the Iraqi force has many fewer tanks, armored personnel carriers, and large artillery pieces than it did during Desert Storm, lowering the “tactical” target set. The Iraqi combat forces also may not be in the open desert as they were in Desert Storm, but rather in places either more difficult to bomb or so near civilian populations that the United States would be reluctant to bomb them. While this may shorten the air campaign and its cost, it would also mean that Iraqi forces would not be as degraded by an air campaign as they were in Desert Storm, suggesting that a ground campaign may be more difficult, prolonging both its duration and cost.

On the other hand, while “tactical” Iraqi targets like troops and tanks could be fewer, the “strategic” target list – command facilities, critical infrastructure sites, facilities connected with production or storage of weapons of mass destruction – could be comparable to or larger than it was during Desert Storm. Former U.N. weapons inspector David Kay and others have testified that there were more facilities involved with Iraq’s weapons of mass destruction programs than the United States knew about during Desert Storm, and these largely escaped bombing. In addition, Iraq has probably added to this list since December, 1998 when Iraq barred the U.N. from conducting further investigations.<sup>21</sup> The size of the total target list is thus difficult to determine.

### *Investment*

Procurement and research funding during DS/DS totaled \$8.4 billion (\$10.1 billion in constant 2002 dollars), even though the conflict came virtually on the heels of the largest peacetime buildup of the military in U.S. history. Given the high cost and low stocks of precision guided munitions and missiles, the successful use of Unmanned Aerial Vehicles (UAVs) in Afghanistan, and the potential need to protect against chemical and biological weapons, it may be likely that investment costs could approach or surpass Desert Storm levels even if the force is much smaller. This is thus a modest to significant cost variable.

The cost of air combat is linked to the number of missions flown and the duration of the conflict. It is also dependent, though, on the amount of precision-guided munitions used. Various indicators point to significantly increased use of precision-guided munitions in recent U.S. combat operations compared to the Persian Gulf War. This could be a modest cost factor variable in estimating the costs of a new conflict.

***Exit Strategy*** – The demobilization of U.S. troops began almost immediately after the United States and Iraq agreed to a formal cease-fire on March 3, 1991. The United States led the effort to establish Operation Northern Watch to protect anti-Saddam Kurds in April 1991, and Operation Southern Watch was established to protect Iraqi Shiites in August 1992. Even so, by

the end of September 2002, only 25,000 U.S. forces remained in the area. Since the U.S. policy at the time was limited to ejecting Iraq from Kuwait, and not toppling Saddam Hussein, the United States saw no reason to station large numbers of troops in the area. The United States has spent approximately \$8 billion on the no-fly zones and aid to Kurds since the end of the Persian Gulf War.<sup>22</sup>

This model of a quick drawdown of forces would probably not apply to an invasion of Iraq that results in a regime change. U.S. troops may remain in Iraq in large numbers for an extended period of time after victory. James Webb, former Secretary of the Navy during the Reagan Administration, argues that an American occupation force as large as 50,000 could have to stay in Iraq for 30 to 50 years after the initial military victory. He further argues:

*In Japan, American occupation forces quickly became 50,000 friends. In Iraq, they would quickly become 50,000 targets.*<sup>23</sup>

In addition, given the logistical and other constraints of the military forces of U.S. allies to operate far from their own nations, it may be unlikely that the bulk of peacekeeping forces would come from allies, as is now the case in Bosnia and Kosovo.

If U.S. forces are required to stay in Iraq in sizeable numbers for an extended period of time, it is a significant cost variable. Even if the initial combat force that ousts Saddam Hussein is half the size or less than the DS/DS force, this variable could cause the military costs of a new war with Iraq today to ultimately exceed the Persian Gulf War. Moreover, if these U.S. forces are in an openly hostile environment, costs would be even greater due to the need for a higher level of protection and operational tempo for the forces. It is beyond the scope of this report to estimate those costs.

## IV. Estimates of Costs of A New War with Iraq

### *Discussion of Cost Estimating Options*

The ideal way to estimate the cost of a U.S. attack on Iraq to overthrow Saddam Hussein would be to use DoD-approved cost models and “plug in” to these models exact levels of forces, timelines of buildup and combat, and amounts of equipment and munitions. For example, if we know one Army heavy armored division would be used, and its cost is \$3.0 billion per year, a lot of guesswork is eliminated. However, the DoD cost models are classified, and predicting precise levels of forces, timelines, equipment, and munitions are beyond the scope of this analysis.

Instead, this analysis attempts to provide estimates for two different generic scenarios based primarily on cost data from DS/DS (see *Appendix Two* for explanation and discussion of estimating methodology). New War Scenario A involves a total of 250,000 U.S. personnel, and is intended to be representative of the reported upper range of Pentagon planning. Scenario B assumes a total force of 125,000 personnel, and is intended to be representative of options involving much smaller numbers of ground troops that work (at least partly) in tandem with indigenous anti-Saddam Iraqi forces.<sup>24</sup> Within each scenario, actual combat operations are assumed to last either 30 or 60 days, and separate cost estimates are provided.

These scenarios are inherently and admittedly speculative, as are all cost estimates, and thus the estimates are not definitive. Rather, they are provided as a starting point for discussion about possible levels of spending under specific assumptions. It is also hoped that *Part III* of this report prompts discussion on how different cost variables could affect the final cost of any U.S. military action against Iraq. The cost of any new hostilities with Iraq may or may not affect congressional support for such action, but many Members of Congress have indicated a desire to have some notion of the costs.

### *Advantages of DS/DS Data*

Using DS/DS cost data does provide advantages. It is readily available, and is based on actual combat experience 11 years ago against the same enemy. The expected theater of operations would be very similar. Any new war with Iraq is certain to be much larger than our recent engagements in Kosovo and Afghanistan, even if the lower end of reported manpower levels are assumed. This arguably makes DS/DS data very relevant even if it is 11 years old.

Also, the use of the DS/DS data can help avoid the inherent pitfalls of anyone outside the actual military planners themselves in trying to predict precise levels of specific types of military forces, equipment, and munitions. Thus, using DS/DS cost data is in many ways preferable to other alternatives as long as the limitations of the data are understood.

See *Appendix Two* for further discussion.

### ***New War Scenario A: U.S. Military Forces Total 250,000***

The manpower assumptions used in New War Scenario A are based on press reports and thus do not represent official Pentagon planning.<sup>25</sup> As discussed, the number of troops is a significant cost variable; if the numbers of forces assumed changes significantly, the estimates provided here would change commensurately. The other principal assumptions are discussed after the table. Assumptions are also discussed in greater detail in *Appendix Two*.

#### **New War Scenario A: 250,000 U.S. Military Personnel** (Constant 2002 Dollars in Billions)

<b><u>Cost Category</u></b>	<b><u>DS/DS</u></b>	<b><u>30 Days of Combat</u></b>	<b><u>60 Days of Combat</u></b>
Airlift/Sealift (Buildup)	10.6	6.6	6.6
Personnel & Personnel Support	21.5	11.3 - 13.4	11.3 - 13.4
Operating Support & Fuel	32.2	14.6 - 19.0	18.6 - 24.1
Investment	10.1	10.1	10.1
All Other	<u>5.6</u>	<u>5.6</u>	<u>5.6</u>
<b>Total Costs</b>	<b>79.9</b>	<b>48.3 - 54.7</b>	<b>52.2 - 59.8</b>

*Note: Numbers do not add due to rounding.*

*Source: House Budget Committee Democratic Staff (see [Appendix One](#) for explanation of cost categories used and [Appendix Two](#) for further explanation and discussion of methodology).*

The primary reason that New War Scenario A is estimated to cost less than the Persian Gulf War in the buildup, personnel, and operating accounts is that U.S. forces are assumed to be one-half of the size of the force used during DS/DS. This analysis assumes that this would:

- 1) lower buildup costs because the United States would transport less personnel and equipment in and out of the theater of operations;
- 2) decrease personnel and personnel support costs by approximately one-half;
- 3) reduce the amount of equipment and weapons that would be needed, thus reducing maintenance and reconstitution costs; and
- 4) reduce fuel consumption.

Although the buildup is assumed to be two and one-half months less in New War Scenario A than it was during DS/DS, the analysis assumes that personnel stay in the theater of operations the same amount of time as they did during DS/DS. This effectively assumes that U.S. personnel would stay at or near full force for two and one-half months after Saddam Hussein is ousted, and then begin a demobilization schedule that parallels the Persian Gulf model starting with the



signed peace accord. This seems a prudent assumption given that the mission of regime change would likely not permit rapid demobilization beginning immediately after victory as was the case in the Persian Gulf War.

The 30-day and 60-day combat scenarios chosen are based on the analysis in *Part III* of this report. Iraqi forces are undoubtedly smaller and less prepared than they were when they were expelled from Kuwait. It is also generally recognized that U.S. forces are more capable now than they were 11 years ago.

On the other hand, Iraqi forces may have some advantages defending their own country that they did not have in DS/DS. Because Desert Storm took 43 days, this analysis assumed one combat scenario that would be a bit more rapid and one scenario that was a bit slower.

The duration of the conflict is assumed to affect only operating support and fuel consumption, and not the other cost categories. The difference between 30 and 60 days of combat operations under Scenario A is \$4.0 billion, a relatively modest difference. However, a recent analysis by the Congressional Budget Office determines that the cost of Army personnel in Kosovo is much higher in real terms than it was during DS/DS.<sup>26</sup> This potential real increase in cost is reflected in both the personnel support and operating support categories, and is the reason for showing a range in these two categories in the table (See *Appendix Two* for further discussion).

#### ***Investment and Other Costs***

Despite the smaller force size, investment (procuring weapons and weapon upgrades using procurement and research and development funding) is assumed to equal the level of DS/DS. This is primarily due to the assumptions that the United States would have a much greater reliance on more expensive precision-guided munitions than it did during Desert Storm, and that the military is taking action on the heels of the war in Afghanistan rather than the heels of the largest peace-time buildup in U.S. military history.

Other costs are assumed to also equal the DS/DS level, primarily due to intelligence requirements (see *Appendix Two* for further discussion).

The analysis assumes that U.S. military operations would not be hindered by overly constrained basing or overflight routes, and the war generally proceeds at an operational tempo similar to that in the Persian Gulf War.

Notably, the estimates for New War Scenario A do not assume the following:

- any occupation costs or post-conflict assistance to Iraq, primarily because it is beyond the scope of this particular report to credibly provide estimates;
- any use of weapons of mass destruction against U.S. forces, or any casualties not comparable with the Persian Gulf conflict;
- any non-military costs related to convincing other nations to support U.S. action, such

- as forgiving Turkey's loans;
- subsequent terrorist activity in the wake of U.S. action; or
- increased interest costs due to additional U.S. borrowing to finance the war.

Any or all of these costs may be significant. For example, the 10-year (2003-2012) interest costs for Scenario A would be approximately \$26.8 billion for the low-end estimate of \$48.3 billion and \$33.2 billion for the high-end estimate of \$59.8 billion.

### ***Scenario B: U.S. Force Totals 125,000***

As the table below indicates, a force half the size of New War Scenario A results in even lower estimated costs. The cost is not one-half, however, due partly to fixed costs. The analysis assumes New War Scenario B would have the same fixed costs as Scenario A, but that all variable costs would be one-half those of Scenario A.

#### **New War Scenario B: 125,000 U.S. Military Personnel** (Constant 2002 Dollars in Billions)

<b><u>Cost Category</u></b>	<b><u>DS/DS</u></b>	<b><u>30 Days of Combat</u></b>	<b><u>60 Days of Combat</u></b>
Airlift/Sealift (Buildup)	10.6	5.0	5.0
Personnel & Personnel Support	21.5	6.7 - 7.7	6.7 - 7.7
Operating Support & Fuel	32.2	7.9 - 10.1	9.9 - 12.7
Investment	10.1	7.0 - 10.1	7.0 - 10.1
All Other	<u>5.6</u>	<u>3.9</u>	<u>3.9</u>
<b>Total Costs</b>	<b>79.9</b>	<b>30.6 - 36.8</b>	<b>32.6 - 39.4</b>

*Note: Numbers do not add due to rounding.*

*Source: House Budget Committee Democratic Staff (see [Appendix Two](#) for further explanation and discussion of methodology).*

The analysis also assumes:

*Investment* would be between 70 and 100 percent of the Scenario A requirement, primarily because the size of the U.S. ground force are not assumed to significantly affect air operations, (particularly the use of precision-guided munitions).

*Other Costs* would also equal 70 to 100 percent of the Scenario A requirement, primarily due to the assumption that intelligence requirements would not be terribly sensitive to the size of the force.

Other than these exceptions, the same assumptions that were assumed for Scenario A are

assumed for Scenario B. The 10-year (2003-2012) interest costs for Scenario B would be approximately \$17.0 billion for the low-end estimate of \$30.6 billion and \$21.9 billion for the high-end estimate of \$39.4 billion.

### ***Further Discussion of Costs Not Included In Estimates***

***Unintended Consequences*** – Shortly after Desert Storm, then-Secretary of Defense Richard Cheney stated:

*Despite his [Saddam Hussein's] attempts to intimidate his neighbors, the Gulf states requested outside help; a coalition formed; the Arab 'street' did not rise up on his behalf; and Israeli restraint in the face of Scud attacks undermined his plan to turn this into an Arab-Israeli war.<sup>27</sup>*

If Saddam Hussein were able to turn a conflict today into an Arab-Israeli war, a possible but predictable response would be an increase in terrorist attacks against the United States rather than a direct confrontation with U.S. conventional forces. Quantifying the costs of such terrorist acts is difficult to impossible, but they clearly would have a negative impact on the U.S. budget.

***Non-Military Costs*** – This analysis has focused on the cost of a military operation against Iraq to (primarily) oust Saddam Hussein, but other budgetary costs associated with a war against Iraq would be incurred as well. For example, as the discussion about Turkey conditioning its assistance indicates, obtaining cooperation from key neighbors of Iraq could require increases in foreign assistance.<sup>28</sup> Increased military aid to Israel could be required as well.

The cost of rebuilding Iraq into a democratic, economically viable country would also likely require substantial increases in foreign aid to Iraq after Saddam is ousted. Iraq's oil reserves could mitigate such costs, but Iraq is heavily indebted and the combination of the Gulf War and trade sanctions has resulted in a deterioration of the Iraqi economy and its infrastructure. The World Bank and others estimate that the cost of recovering from a conflict usually requires average annual per-capita aid of \$40 to \$80.<sup>29</sup> Iraq's current population is estimated to be about 23 million,<sup>30</sup> which means that a 10-year aid package could be approximately \$9.2 billion to \$18.4 billion.

The impact of the war on the U.S. economy is difficult to estimate. It is possible that a new war with Iraq could temporarily adversely affect oil supplies, driving up oil and fuel prices and producing an undesirable ripple effect through the U.S. (and global) economy. It is also possible that increased spending on defense items could have a short-term stimulative effect on the economy. It is beyond the scope of this analysis to estimate the impact of the war on the economy.<sup>31</sup>

Finally, the United States is now facing on-budget (non-Social Security) deficits for at least the next eight years without factoring in any costs related to new military action against Iraq. Any

new costs would add to already sizeable on-budget deficits, requiring the United States to further increase its borrowing to finance the non-Social Security operations of the government. Of course, this added borrowing results in higher federal interest costs.

## **Appendix One. Summary of Conduct of the Persian Gulf War and Breakdown of Costs by Major Categories**

### ***Summary of the Persian Gulf War***<sup>32</sup>

Saddam Hussein's forces invaded Kuwait on August 2, 1990. The initial order to send U.S. troops to Saudi Arabia to deter Iraq from invading Saudi Arabia was given on August 6, and deployment of combat forces – the beginning of Desert Shield – began on August 7. Air Force fighter jets were sent, and Navy carrier battle groups were either en-route or on station in the Red and Arabian Seas. The first soldiers of the 82<sup>nd</sup> Airborne Division Ready Brigade arrived on August 9, and the entire brigade was in place by August 13. The President authorized the call up of reservists to support Desert Shield on August 22, and the initial build-up of forces was well underway. However, it was not until early October, two months after the Iraqi invasion, that the Commander-in-Chief, Central Command, Gen. H. Norman Schwarzkopf, believed that he had enough forces in place to withstand an Iraqi invasion of Saudi Arabia.

By mid-October, the vast majority of Iraqi combat forces were in Kuwait and establishing defensive positions. At the time, Iraq had the fourth largest Army in the world, and 27 Iraqi divisions were deployed in Kuwait, including eight Republican Guard divisions. Iraqi ground forces totaled about 500,000 by the start of Desert Storm. In November, President Bush ordered that U.S. forces be doubled, and by mid-January 1991, U.S. forces were approximately 500,000 strong.

On January 16, 1991, Desert Storm began with Tomahawk launches and F-117 stealth fighter attacks. The air campaign's initial goal was to establish air supremacy by disabling Iraqi radars, its air force, and its anti-air capabilities. The air campaign also sought to:

- 1) incapacitate the Iraqi leadership by destroying command facilities and degrading its capability to communicate with its troops;
- 2) destroy Iraq's nuclear, chemical, and biological weapons and the facilities devoted to developing them;
- 3) wreak havoc on Iraqi military capability by destroying military production and storage sites, oil refining and distribution facilities, and key portions of Iraq's electrical grid; and
- 4) degrade the military effectiveness of Iraq's forces in Kuwait by 50 percent.

The air campaign was intense. The United States flew about 100,000 sorties, and as the table indicates, dropped 85% of the average bomb tonnage per month that the United States expended during World War II.<sup>33</sup> A little less than one-third of the U.S. sorties were flown by Navy and Marine Corps aviators, and many of these were from the four carrier battle groups in the Red Sea and Persian Gulf. Land-based flights occurred primarily from Saudi Arabia, Bahrain, Qatar, the United Arab Emirates, Oman, Egypt, Turkey, England, and Spain.

### Comparison of Bombing Tonnages in U.S. Conflicts

<u>War</u>	<u>Tonnage</u>	<u>Length</u>	<u>Tonnage/Month</u>
WWII	2,150,000	45 Months	47,778
Korea	454,000	37 Months	12,270
Vietnam	6,162,000	140 Months	44,014
Desert Storm	60,624	1.5 Months	40,416

The air campaign was also largely successful. Air supremacy was achieved by January 27. The ground campaign started about five weeks after the start of Desert Storm, after Gen. Schwarzkopf determined that the military effectiveness of Iraqi forces in Kuwait had been seriously degraded by air attacks. The only apparent shortcoming of the air campaign was that the United States and coalition forces proved unable to detect or destroy mobile SCUD launchers despite an average of more than 100 sorties per day for the 43-day duration of the conflict (approximately 88 SCUDS were launched by Iraq and no launchers were destroyed).<sup>34</sup>

The ground campaign of Desert Storm lasted just 100 hours. During Desert Shield, U.S. naval forces conducted minesweeping operations and amphibious landing exercises to convince the Iraqis that an amphibious landing on Kuwaiti shores was an integral part of a U.S. attack. Meanwhile, the Army's VII Corps and XVIII Airborne Corps shifted west in Saudi Arabia. On February 23, the ground campaign began with the key feature of the attack being these corps conducting a "left hook" that took Iraqi forces by surprise while amphibious forces only feinted landings. Iraqi forces were soon routed from Kuwait and fled back to Iraq via a four-lane highway from Kuwait City to the Al Jahra' pass that became known as the "Highway of Death." The United States called a ceasefire on February 27, 1991.

### Iraqi Forces: Then and Now

	<b>August, 1990</b>	<b>2000</b>
Army Personnel	955,000	375,000
Republican Guard Personnel	150,000	60,000 - 80,000
Tanks	5,000+	2,200
Artillery Pieces greater than 100mm	5,000+	1,900
Combat Aircraft	700	310

Desert Storm seriously degraded Iraq's military capabilities. At the end of the Gulf War, the

United States estimated that it destroyed 3,800 of Iraq's 5,000 tanks during Desert Storm, most of its 3,000 artillery pieces, and about 30 percent of its armored personnel carriers. Much of the Iraqi airforce fled to Iran or was destroyed. The table below compares the 1990 Iraqi force prior to Desert Storm with the most recent, unclassified estimates of the force as of 2000.<sup>35</sup>

### ***DS/DS Costs by Major Cost Category***

The table illustrates the major cost categories of the \$61.1 billion gross cost of the war:

<b>Costs of the Persian Gulf War by Major Cost Categories (Dollars in Billions)</b>		
<b>Cost Category</b>	<b>Cost</b>	<b>Percentage of Total Costs</b>
Airlift	3.3	5.4%
Sealift	5.0	8.2%
Personnel	8.0	13.1%
Personnel Support	6.9	11.3%
Operating Support	20.6	33.7%
Fuel	4.9	8.0%
Investment	8.4	13.8%
All Other	<u>4.0</u>	<u>6.6%</u>
<b>Total</b>	<b>61.1</b>	<b>100.0%</b>

Source: *Final Report on United States Costs in the Persian Gulf Conflict and Foreign Contributions to Offset Such Costs*, November 15, 1992 (OMB).

Airlift, Sealift, Operating Support, and Fuel fall under the broad category of Operations and Maintenance (O&M) funding and accounted for 55 percent (\$33.8 billion) of the cost of the war, while total personnel costs accounted for 45 percent (\$27.5 billion). Each cost category is discussed below.

***Airlift*** – Airlift accounted for only 5 percent of the cargo transported to and within the DS/DS theater of operations, yet it cost \$3.3 billion. This means that 5 percent of the cargo ate up 40 percent of the total transportation budget.

***Sealift*** – Sealift carried 95 percent of the cargo needed for DS/DS. In terms of cost per ton, it is far cheaper than airlift. However, it takes more time. During Desert Storm, it took about three months just to transport enough personnel and equipment to establish a credible defense of Saudi Arabia. It took another three months to get the personnel and

equipment necessary to start offensive operations.

***Operating Support*** – Represents the cost of conducting DS/DS and the logistics behind these operations. Examples include the cost of operating aircraft, ships, and ground vehicles, and restoring equipment to a usable state after operations (reconstitution). Detailed breakdowns comparing the cost of the air campaign and the ground campaign are not available. However, the air campaign consisted of about 100,000 sorties, of which almost half (48,000) were strike sorties against more than 1,200 targets. Of this amount, 22,000 were directed against Iraqi ground forces. Almost every strike sortie had to be supported by refueling, most of which occurred over Saudi Arabia. Ground troops comprised 55 - 60 percent of the approximately 500,000 U.S. personnel in the region.<sup>36</sup>

***Fuel*** – Saudi Arabia provided much of the fuel used by U.S. forces. The \$4.9 billion includes the in-kind contribution of Saudi Arabia and other Gulf states.

***Personnel*** – These costs are the incremental costs associated with sending soldiers, Marines, airmen, and sailors into a theater where hostilities are imminent. For active duty troops, this cost is the increase due to imminent duty pay. The increase in pay due to calling up reservists and National Guard personnel into active duty are also included.

***Personnel Support*** – Includes subsistence (food and water), uniforms and other gear such as anti- chemical and anti-biological weapon suits, and medical costs.

***Investment*** – Primarily includes the purchase of ammunition, weapon systems, weapon system improvements and upgrades required for battle, and other war-related equipment purchases. DS/DS occurred after the large military buildup that occurred during the Reagan Administration and prior to the downsizing that occurred after the Soviet Union dissolved in December 1991. The U.S. military was still fully equipped to deter the much larger Soviet force and was thus relatively well-prepared for a battle with Iraq. Even so, the U.S. purchases directly due to the war totaled \$8.4 billion, or about 14 percent of the war's gross cost of \$61.1 billion. Of the \$8.4 billion, the Air Force accounted for \$3.4 billion, the Navy \$2.5 billion, the Army \$2.4 billion, and the remaining small amount was spread among various DoD agencies.

***All Other*** – This category includes a variety of items, including intelligence and military construction. Intelligence costs of DS/DS are not publicly available, but are believed to be a large component of other costs. Military construction – building of barracks to house the troops and other required facilities for supply storage and administration – for DS/DS totaled \$351 million, of which \$346 million was for the Army and the remainder for the Air Force. Other costs not easily assigned to one of the other cost categories are also included here.



## **Appendix Two: Explanation and Discussion of Estimating Methodology**

### ***Incremental Contingency Costs***

All of the costs described in this report represent incremental costs – those that would not have occurred but for the military operation. For example, the regular pay for active duty military personnel is not considered an incremental cost because it would have to be paid even if no military contingency arose. However, imminent danger pay only occurs during a military contingency, so the increase in pay due to imminent danger is considered an incremental cost.<sup>37</sup>

The DoD reported incremental costs for DS/DS to be \$61 billion (not adjusted for inflation). New War Scenarios A and B of this report are incremental cost estimates.

### ***Sources of Data***

The primary source of data for the costs of the Persian Gulf conflict is the OMB report, *Final Report on United States Costs in the Persian Gulf Conflict and Foreign Contributions to Offset Such Costs*, dated November 15, 1992. This data was complemented by Congressional Research Service data that reflects subsequent DoD adjustments to the OMB final report. All conversions to constant 2002 dollars were done by House Budget Committee Democratic Staff using budget authority deflators found in the Office of Secretary of Defense/Comptroller report entitled *National Defense Budget Estimates for the Fiscal Year 2003 Budget*, otherwise known as the *Green Book*.

All other sources of data not readily available are acknowledged in endnotes.

### ***Methodology of the New War Scenarios***

*Airlift and Sealift* estimates are made by identifying fixed and variable costs from the DS/DS cost data. Fixed costs are estimated to be the same for both scenarios. Variable costs for Scenario A are assumed to be 55 percent of the DS/DS variable costs because the three-month period assumed is 55 percent of the five and one-half month duration of Desert Shield. Variable costs for Scenario B are assumed to be one-half the variable costs of Scenario A because the force is one-half the size.

The scenarios assume no difference in these costs for 30 days of combat or 60 days of combat because U.S. forces usually are conservative in estimating supply requirements, and thus are assumed to ship the same amount of equipment and supplies for an operation since they would not have advance knowledge of the length of operations. The analysis also assumes that improvements in sealift efficiency (including greater use of prepositioning) result in the logistical buildup to be completed within three months in both scenarios. The airlift to sealift ratio is not assumed to be significantly different than it was during DS/DS in either scenario.

*Personnel and personnel support* costs are estimated by identifying fixed and variable costs from

the DS/DS cost data. Fixed costs are estimated to be the same. Variable costs for Scenario A are assumed to be 50 percent of the DS/DS variable costs because the force is one-half the size. Likewise, the variable costs of Scenario B are assumed to be 50 percent of Scenario A. It is possible that the cost deflators used do not fully measure the increase in hazardous duty costs, and thus may slightly understate personnel costs.

*Operating support* costs are estimated by identifying fixed and variable costs from the DS/DS cost data. Fixed costs are estimated to be the same. Variable costs for Scenario A are assumed to be 50 percent of the DS/DS variable costs because the force is one-half the size, and Scenario B variable costs are assumed to be 50 percent of the Scenario A costs.

In addition, House Budget Committee staff derived an assumed rate of operation support during combat. This was derived by assuming the 10 and a half months of FY 1991 in which combat operations did not occur was at the same approximate level as during August and September 1990. This assumption permitted a per-day combat rate to be derived. This per-day rate was used to estimate the 30- and 60-day scenarios.

*Fuel* costs contained no fixed costs. Scenario A assumed fuel costs to be 50 percent of the DS/DS costs, adjusted for combat operations using the same methodology used to calculate operating support for combat operations. Scenario B assumed fuel costs to be 50 percent of the Scenario A estimate.

*Investment* for Scenario A is assumed to be the same as in DS/DS. The reason for this assumption is that it seems likely that the United States would have to purchase more equipment now than it did prior to DSDS. This is primarily due to the assumptions that (1) the United States would have a much greater reliance on more expensive precision-guided munitions than it did during Desert Storm, and (2) the military would be going into action on the heels of the war in Afghanistan rather than the heels of the largest peace-time buildup in U.S. military history.

The investment costs for Scenario B are assumed to be 70 to 100 percent of the costs of Scenario A. Although the force size is assumed to be one-half the size of the Scenario A force, the analysis assumes that procuring equipment for the air war would largely be unaffected by the size of the ground troops. It is also possible that equipment to support ground forces may represent high-value items in short supply, such as unmanned aerial combat vehicles, and may not be very sensitive to the size of the ground force as well.

*All Other* includes military construction, intelligence, miscellaneous costs, and subsequent DoD adjustments to data that are not easily assigned to one of the above categories. This is assumed to equal DS/DS because intelligence is probably an even larger driver of costs now than 11 years ago. The request for "situational awareness" funding for operations against Afghanistan was approximately \$5.1 billion; the analysis assumes that intelligence and other "situational awareness" requirements for Iraq would be of the same order of magnitude. The analysis also assumes that intelligence requirements would not be particularly sensitive to the size of the U.S. force; thus All Other costs for Scenario B is assumed to be 70 to 100 percent of the Scenario A estimate.

*Length of Time in Theater.* While the Scenario A and B estimates assume different lengths of combat than what occurred in DS/DS, the total time period covered is assumed to be the same. By assuming a two and one-half month shorter buildup period, however, the analysis assumes a post-victory force remains intact for two and one-half months longer than it did during Desert Storm. This is a conscious decision to reflect the fact that U.S. forces would need to remain longer because the mission is to effect regime change (see discussion in *Exit Strategy of Part III*). After this two and one-half month period, the demobilization is assumed to parallel the Persian Gulf War experience.

*Potential Increase in Costs Since DS/DS.* The House Budget Committee Democratic Staff estimates that the per-capita cost of U.S. personnel in DS/DS excluding airlift and sealift costs was \$117,000 in constant 2002 dollars. As discussed earlier, CBO estimates the cost per Army troop excluding transportation costs in Kosovo to be \$160,000. The reasons for this apparent increase are not known. This analysis applies this approximately 35 percent growth to the personnel support and operating support variable costs to derive upper end ranges in the estimates.

*Interest cost calculations.* A notional outlay rate of DS/DS outlays was derived from Congressional Research Service data.<sup>38</sup> Applying this outlay rate to the budget authority estimates used in New War Scenarios A and B resulted in a stream of projected outlays. CBO's August 2002 interest matrix was used to calculate interest based on this rate of projected outlays. As might be expected, the majority of outlays for an intense military operation occur in the first three years of the ten-year period (2003 - 2012) assumed. Such "frontloading" naturally results in higher interest rate outlays than would occur if the costs were spread evenly over the ten-year period.

### ***Limitations of Using DS/DS Data***

Use of DS/DS cost data have the advantage of being based on actual combat against the same, albeit now militarily degraded, enemy in a very similar theater of operations (Kuwait vs. Iraq itself). No other recent conflict – Bosnia, Kosovo, Afghanistan – is as similar to a new war against Iraq as the Persian Gulf conflict in terms of scale.

On the other hand, the available financial data from DS/DS are unclear in some cases and many of the DoD personnel responsible for the original data are no longer available to answer detailed questions. For example, the OMB Final Report identifies non-recurring costs but with either no or brief acknowledgments of what specifically constituted these non-recurring costs. For purposes of this analysis, these costs were assumed to be the fixed costs of each operation. Also, data were not available for the most part by month, or even quarter, for fiscal year 1991 when combat operations occurred. This makes distinguishing combat from non-combat operations difficult. This analysis made assumptions outlined in the *Operating Support* discussion above for the impact of actual combat operations on operating support and fuel costs.

More important than these relatively minor discrepancies in the data, however, is that there may be significant differences in both the size and tactics of U.S. forces today compared to the

Persian Gulf War. As discussed in *Part III*, these difference could have major effects on the actual costs of any military operation.

Finally, GAO issued a report that argued that the DoD and OMB overestimated the costs of Desert Storm.<sup>39</sup> To the extent GAO is correct, this analysis would repeat those overestimates.

## Endnotes

1. National Defense Budget Estimates for FY 1995 (The Green Book), Department of Defense, March 1994, Table 1-11.
2. Sources are Final Report on United States Costs in the Persian Gulf Conflict and Foreign Contributions to Offset Such Costs, November 15, 1992, OMB, and The Department of Defense Green Book for FY 1995 (for post-War adjustments). Interest accrued from cash contributions was \$0.5 billion. Adjustments made subsequent to the Final Report totaled approximately negative \$200 million.
3. Conduct of the Persian Gulf War: Final Report to Congress, Volume I, April 1992, Overview, p. x.
4. “*U.N. Urged to Work on Iraq Resolution*,” Washington Post, Mike Allen, September 16, 2002.
5. “*U.S. Plan for Iraq is Said to Include Attack on Three Sides*,” New York Times, Eric Schmitt, July 5, 2002.
6. “*Timing, Tactics on Iraq War Disputed: Top Bush Officials Criticize Generals’ Conventional Views*,” Washington Post, Thomas E. Ricks, August 1, 2001. Both options mentioned in this article.
7. House Budget Committee Democratic Staff estimate based on data contained in Final Report.
8. House Budget Committee Democratic Staff estimate based on information provided in, Conduct of the Persian Gulf War, Volume I, April 1992, p. 252.
9. “*American Arsenal in the Mideast is Being Built Up to Confront Saddam Hussein*,” New York Times, Eric Schmitt and Thom Shanker, August 19, 2002.
10. “*Military Quietly Posed for Iraq*,” Los Angeles Times, Esther Schrader, September 10, 2002.
11. “*Three Months to Baghdad*,” Washington Times, Op-Ed by Michael O’Hanlon, August 30, 2002.
12. Iraq’s Military Capabilities in 2002: A Dynamic Net Assessment, Anthony Cordesman, Center for Strategic and International Studies, September, 2002, p. 59. “*U.N. Urged to Work on Iraq Resolution*,” Washington Post, Mike Allen, September 16, 2002.
13. Dow Jones International News Service, July 17, 2002. The article reported that U.S. loan forgiveness for Turkey could total \$5 billion, but the House Budget Committee Democratic staff believes that Turkey owes the United States approximately \$4 billion in bilateral loans. Moreover, since budgeting practice requires that a default rate be incorporated into the value of

any loan the United States makes, forgiving Turkey its bilateral debt would result in less than a \$4 billion budgetary cost.

See also “*Backing on Iraq? Let’s Make a Deal,*” Los Angeles Times, Paul Richter and Greg Miller, September 13, 2002.

14. Many defense analysts disagree about whether continued containment is the best option for the United States, or how quickly the United States may defeat Iraq, or how many casualties the United States would sustain, or how best to proceed after Saddam is deposed, but there is virtually no disagreement that the United States would prevail in toppling Saddam if it truly is committed to the fight and can bring to bear its military assets. For example, Anthony Cordesman states:

*What does seem likely, however, is that it would take a major U.S. miscalculation about the size of the forces needed to defeat Iraq or a poorly structured and overconstrained U.S. operation to allow Iraq to ride out the U.S.-led attack through even the best combination of urban and redoubt warfare.* Cordesman, p. 81.

15. The 1990 estimates of tanks, artillery, and combat aircraft are from Conduct of the Persian Gulf War, Volume I, April 1992, p. 9.

The Army and Republican Guard estimates for 1990 are from “*The Iraqi Forces: Large, but Troubled,*” Center for Defense Information Terrorism Project, April 26, 2002, as is the 2000 Republican Guard estimate.

All remaining 1999 estimates are from The Military Balance 2000-2001, International Institute for Strategic Studies, Oxford Press, pps. 140 - 142.

16. Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, Central Intelligence Agency.

17. Proliferation: Threat and Response, Department of Defense, January 2001, p. 39.

18. Data from GAO report, Operation Desert Storm: Evaluation of the Air Campaign, GAO/NSIAD-97-134, June 1997, Appendix IV.

19. Cordesman, p. 60. Cordesman notes that his information is derived from multiple sources, particularly Michael O’Hanlon of the Brookings Institution, for information on Afghanistan. Cordesman also notes that historical sources differ due to technical difficulties in calculating weapons used and the ratio of precision to non-precision weapons.

20. The Desert Storm estimate for a Navy Tomahawk is based on data from GAO report, Operation Desert Storm: Evaluation of the Air Campaign, Appendix IV. Conversion to 2002 constant dollars by House Budget Committee Democratic staff. The cost of a Tomahawk in 2002 dollars is based Summary of Procurement Programs (P-1 book), FY 2002 budget submission, Department of Defense, p. N-8. The unit cost is sensitive to the number purchased;

an order for a large number of Tomahawks would lower the per-unit cost cited.

21. Testimony of David Kay, House Armed Services Committee, September 10, 2002.

22. Iraq: Compliance, Sanctions, and U.S. Policy, Congressional Research Service, September 6, 2002, p. 15.

23. “*Heading for Trouble*,” Washington Post, Op-ed by James Webb, September 4, 2002.

24. The lower end estimate is loosely based on reports of 70,000 ground forces. The analysis assumes an additional 55,000 in Air Force and Naval forces. This estimate of Air Force and Naval forces may be too high, but on the other hand, most press reports also indicate that the Army is strongly resisting a ground force of only 70,000. The 125,000 total estimate is almost assuredly too low if ground forces total 100,000 or more. Thus, 125,000 was chosen as the middle ground of low-end options. “*Timing, Tactics on Iraq War Disputed: Top Bush Officials Criticize Generals’ Conventional Views*,” Washington Post, Thomas E. Ricks, August 1, 2001. Both options mentioned in this article.

25. Anthony Cordesman offers the following thoughts on the reports of military personnel estimates:

*Although various analysts and journalists have quoted figures for U.S. manpower requirements, such estimates are little more than military drivel. The number of people engaged in battles had little impact on outcome as early as the U.S. civil war and the type and quality of forces has long been critical.* Cordesman, p. 79.

It is beyond the scope of this analysis to either confirm, refute, or otherwise argue this point. However, strictly from a cost estimating perspective, the manpower numbers do matter. Besides the cost of the paying the personnel themselves, the number of military personnel directly affects transportation requirements in getting to and from the theater, the amount of logistical support required, and equipment requirements – all of which affects the cost of an operation.

26. Estimate of the Costs of the War in Afghanistan, Congressional Budget Office, April 2002.

27. Conduct of the Persian Gulf War, Volume I, April 1992, Overview, p. iii.

28. “*Backing on Iraq? Let’s Make a Deal*,” Los Angeles Times, Paul Richter and Greg Miller, September 13, 2002.

29. Afghanistan: Preliminary Needs Assessment for Recovery and Reconstruction, joint study by the World Bank, Asian Development Bank, and United Nations Development Program, January 2002, p. 46.

30. The World Factbook 2001, Central Intelligence Agency, p. 243.

31. Readers may wish to look at Financing Issues and Economic Effects of Past American Wars, Congressional Research Service, November 7, 2001 (RL31176) for further information on this

subject.

32. All information on the summary of the war is derived from Conduct of the Persian Gulf War, April 1992, unless otherwise noted.

33. Federation of American Scientists website, [www.fas.org/man/dod-101/ops/desert\\_storm](http://www.fas.org/man/dod-101/ops/desert_storm).

34. Conduct of the Persian Gulf War, Volume I, April 1992, p. 225. Notwithstanding endnote 32, this is specifically noted to assist readers interested in further information on this subject.

35. The 1990 estimates of tanks, artillery, and combat aircraft are from Conduct of the Persian Gulf War, Final Report to Congress. Volume I, April 1992, p. 9. The Army and Republican Guard estimates for 1990 are from the Center for Defense Information Terrorism Project, The Iraqi Forces: Large, but Troubled, April 26, 2002, as is the 2000 Republican Guard estimate. All remaining 1999 estimates are from the International Institute for Strategic Studies, The Military Balance 2000-2001, Oxford Press, pps. 140 - 142.

36. Personnel numbers changed daily during DS/DS, and there are also discrepancies in official reporting data on the number of personnel in the theater of operations for DS/DS. This analysis assumes the widely reported total of approximately 500,000 total U.S. military personnel.

37. This concept is explained in more detail in, among other publications, Operation Desert Shield/Desert Storm: Costs and Funding Requirements, GAO/NSIAD-91-304, September 1991, p. 4.

38. National Defense Budget Estimates for FY 1995 (The Green Book), Department of Defense, March 1994, Table 1-11.

39. Operation Desert Shield/Desert Storm: Costs and Funding Requirements, GAO/NSIAD-91-304, September 1991, p. 1 and elsewhere.